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IMPACT ON WATER QUALITY OF KRISHNA RIVER AFTER AMALGAMATION OF GODAVARI RIVER WATER VIA PATTISEEMA

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Abstract - *This research paper deals the study on Impact on Water Quality of Krishna River after Amalgamation of Godavari River Water via pattiseema. Water Quality Index (WQI) is a single no which tells that water is in what state by using all the parameters. It is very useful to all the people to know the status of water quality very easily. As the pure water is not sufficient to all so amalgamation of rivers has been going from few decades in all over the world. The Krishna River has unique nature of water quality due to its subsurface. In the present study, the water quality of Krishna River with the addition of Godavari water has been studied. The 2 liter water samples are collected by Grab Sampling process at a distance of 50meters from river Catchment at five different places of Krishna & Godavari Rivers and they are mixed with proper mix proportions, and then analyzed in the laboratory using APHA standard procedures. With the help of analytical results, the WQI was estimated using weighted average method with the use of IS10500:2012 standards and those are compared with standard WQI values. Initially the WQI of Krishna River has Good Quality Status. The result of the work states that the average Krishna's water quality has fall under* ***Poor water quality region*** *after amalgamation of Godavari due its nature.*

***Key Words*: (Surface water, Krishna River, Godavari River, Water Quality Parameters and Water Quality Index.)**

1. INTRODUCTION

Water is one of the gifts from nature and also basic needs to survival on the earth. The 90% of water can recycle and used for daily purposes. The formation of water is a hydrological cycle process. The sources of water are surface and ground water. Basically the water is pure condition but due to mixing of many particles quality has been changed. The water is important for any type of industries. The 50% wastes from industries are directly released to rivers and seas. Due to insufficient rainfall, to balance the demand and supply of water the Government of India has taken an action to inter link the major rivers (like Krishna-Godavari). The parameter of one river differs from another. So, by that the water quality also changes. Hence it is needed to compare the water quality of Krishna River before and after amalgamation of Godavari River. Here we used a predefined tool to find the Water Quality Index status. WQI is one of the most effective and simplified tool to communicate information on overall quality status of water to the concerned user community and policy makers.

The Krishna & Godavari Rivers are the biggest rivers in terms of water capacity & river catchment area in India. These are long, widen and originate at western lands of Maharashtra at elevation of 1300mts above sea level and ends at Bay of Bengal. Krishna-Godavari basin, it is a major source of irrigation for Maharashtra, Karnataka, Telangana and Andhra Pradesh. To satisfy all needs so many dams and barrages are constructed on rivers. So due to these heavy hydraulic structures the capacity of the catchment areas of these structures are rapidly decreasing. Hence government of AP has taken a decision of amalgamation of Godavari River's flood water with Krishna water through polavaram right bank canal by pattiseema lift with national water way

4. Due to the mixing of Godavari flood water in Krishna the parameters may change so by taking 5 samples at different stations of Krishna and Godavari the tests are carried out.

2. MATERIALS AND METHODS

The two liter water samples are collected by Grab Sampling process at a distance of 50meters from river Catchment at five different places of Krishna & Godavari Rivers and they are mixed with proper mix proportions, and then analyzed in the laboratory using APHA standard procedures. Mixed proportions are listed in Table.1. With the help of these analytical results, the WQI was estimated using weighted average method with the use of IS10500:2012 standards and those are compared with standard WQI values. The parameters which are consider for analysis are pH, Electrical Conductivity, Turbidity, Alkalinity, Chlorides (Cl^-), Fluorides (F^-), Total Dissolved Solids (TDS), Total Hardness, Calcium Hardness, Magnesium (Mg), Nitrates (NO_3^-), Nitrites (NO_2^-), , Sulphates (SO_2^{4-}) and Iron (Fe).

With the help these WQI was determined. Water Quality Index (WQI) is a very useful method for assessing the quality of water. Water quality is closely linked to the surrounding environment and land use. The water other than in its vapour form, it is never pure and is affected by community uses such as agriculture, urban and industrial use, and recreation. The modification of natural stream flows by dams and weirs can also affect water quality. Water quality is a complex subject, which involves physical, chemical, hydrological and biological characteristics of water and their complex and delicate relations. The calculated weight age values and the parameter standards are given in Table.2. WQI is computed by adopting the following formula.

$$WQI = \sum_{i=0}^{n} Q_i W_i$$

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Q_i = water quality rating
W_i = Unit weight age value of water

$$Q_i = 100 * [\frac{V_a - V_i}{V_s - V_i}]$$

V_a = Actual value present in water sample,
V_s = Standard value of parameter
V_i = Ideal value (0 for all except pH and DO)

$$W_i = \frac{K}{S_n}$$

K = Parameter based Constant
S_n = Standard value of parameters (=V_s)

$$K = \frac{1}{\left(\frac{1}{V_{s,EC}}\right) + \left(\frac{1}{V_{s,Turbidity}}\right) + \left(\frac{1}{V_{s,pH}}\right) + \ldots\ldots\ldots\ldots\ldots\ldots\ldots + \left(\frac{1}{V_{s,Sulphates}}\right)}$$

Table.1. Mixed Proportion Details

S.No	Sample Code	Sample Number	Proportion Ratio	Volume Taken From Each Source (for 1500ml)
1	SM_1	Sample No 1	1G:1K	750ml Godavari water & 750ml of Krishna water
2	SM_2	Sample No 2	1G:2K	500ml Godavari water & 1000ml of Krishna water
3	SM_3	Sample No 3	1G:3K	375ml Godavari water & 1125ml of Krishna water
4	SM_4	Sample No 4	2G:1K	1000ml Godavari water & 500ml of Krishna water
5	SM_5	Sample No 5	3G:1K	1125ml Godavari water & 375ml of Krishna water

Table 2: Water quality parameter, standards and weight age values

Parameter	Standard Values (V_s= S_n)	Weight age (W_i)	Parameter	Standard Values(V_s=S_n)	Weight age (W_i)
E C	300	0.000130	**Magnesium**	30	0.001304
Turbidity	1	0.039124	**Iron**	0.3	0.130413
pH	7.5	0.005217	**Fluorides**	1	0.039124
TDS	500	0.000078	**Chlorides**	250	0.000156
TH	200	0.000196	**Nitrites**	0.05	0.782480
Alkalinity	200	0.000196	**Nitrates**	45	0.000869
Calcium	75	0.000522	**Sulphates**	200	0.000196

3. RESULTS AND DISCUSSIONS

Analysis of Samples

From the APHA standard procedure the concentration of parameters in various samples are tested and given in Table.3.

a. Electrical conductivity:

All the samples overcome the standards and the high value of electrical conductivity was present in SM_3, 680mhos.

b. pH:

As per standards some samples have high concentration and some are within the limits. The greater pH noted was 7.6 in SM_2 and SM_3

c. Turbidity:

As per standards all the samples except SM_3, contains high concentrations of turbidity. The highest turbidity was noted has 16NTU in SM_4.

d. Total dissolved solids:

As per standards the total dissolved solids content in water samples was within the limits the highest TDS was noted has 442 mg/lit in SM_3.

e. Total Hardness:

The TH content in water samples was within the limits. The highest was noted as 168 mg/lit in SM_3.

f. Alkalinity

As per standards the alkalinity content in water samples was within the limits the highest alkalinity was noted has 80 mg/lit in SM_3.

g. Calcium hardness:

Calcium hardness content in water samples was within the limits the highest was noted as 64 mg/lit in SM_3 and SM_4

h. Magnesium:

The highest magnesium was noted has 25 mg/lit in SM_3. All samples contain concentration of Magnesium within the limits.

i. Iron:

As per standards the iron content in water samples was within the limits, the highest iron was noted as 0.15 mg/lit in SM_2.

j. Fluorides:

As per standards the fluorides content in water samples was within the limits. And all the samples contain same fluorides and it was noted as 0.4 mg/lit.

k. Chlorides:

Chlorides are also available within the limits in all the samples, the highest chlorides was noted as 80 mg/lit in SM_2 &SM_3

l. Nitrates:

As per standards the nitrates content in water samples was within the limits the highest nitrates was noted as 10.4 mg/lit in SM_2.

m. Sulphates:

As per standards the sulphates content in water samples was within the limits the highest sulphates was noted has 29 mg/lit in SM_3.

n. Nitrites:

These are absent in all the samples.

The analyzed data was plotted on sample wise and those are shown in Graph.1. With the use of above mentioned formulae and data noted in Table.1, 2&3, WQI values are obtained. The predicted WQI values and standard WQI values are shown in Table.4,5.

The water quality index was found to be excellent in the SM_3 sample. It is found to be poor WQI in SM_1, SM_2, SM_4 and SM_5 samples. The average WQI of all samples is also come under the status of poor which is 51.72. The results shown in Table 3 are plotted and given in Graph.1.

The predicted WQI Values are tabulated in Table.4. and are shown in Graph.2. from the graph, the WQI values of sample 3 are in the Excellent region and remaining are in Poor Quality region.

Table 3: Concentration of various parameters present in Samples

Parameter	SM_1	SM_2	SM_3	SM_4	SM_5
E C	514	660	680	440	460
Turbidity	12	12	2	16	14
pH	7.5	7.6	7.6	7.3	7.4
TDS	334	429	442	286	299
TH	120	160	168	104	108
Alkalinity	60	76	80	56	56
Calcium	48	64	64	40	44
Magnesium	17	23	25	16	16
Iron	0.14	0.15	0.1	0.14	0.12
Fluorides	0.4	0.4	0.4	0.4	0.4
Chlorides	64	80	80	56	56
Nitrites	0	0	0	0	0
Nitrates	8.2	10.4	9.2	7.6	6.8
Sulphates	22	28	29	18	19

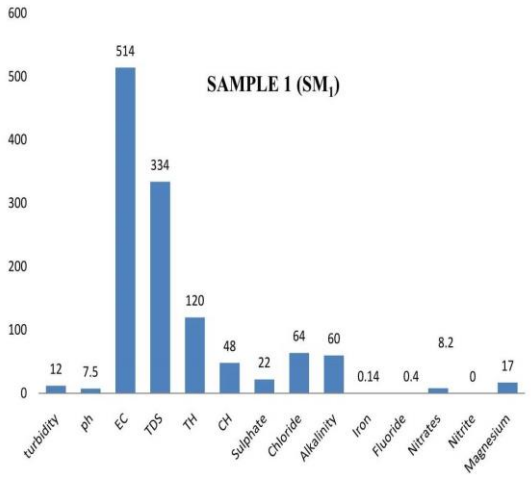
***Turbidity in NTU, Electrical Conductivity in mhos and remaining all parameter in mg/lit**

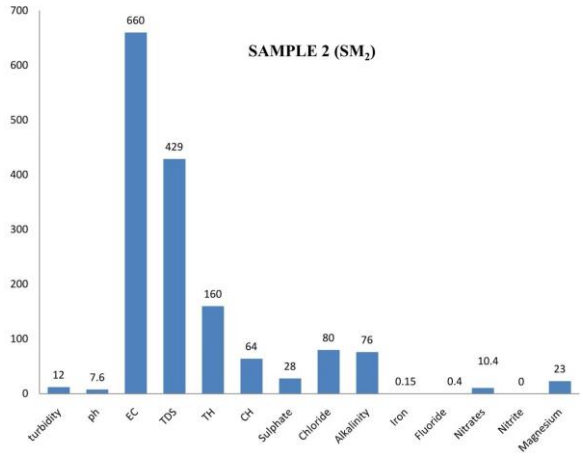
Table 4: Standard WQI Values

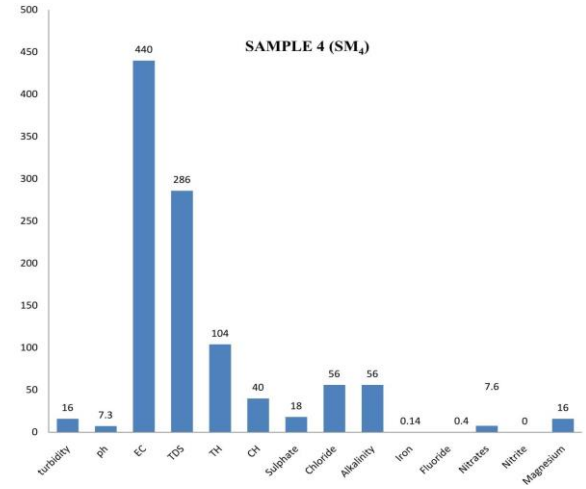
WQI Standard Values	
(WQI) Value	**Status**
0-24	Excellent
25-49	Good
50-74	Poor
75-100	Very Poor
>100	Unfit for Drinking

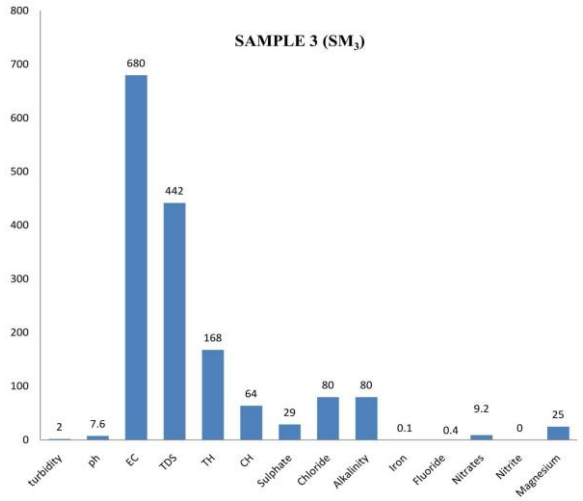
Table 5: Predicted WQI Values

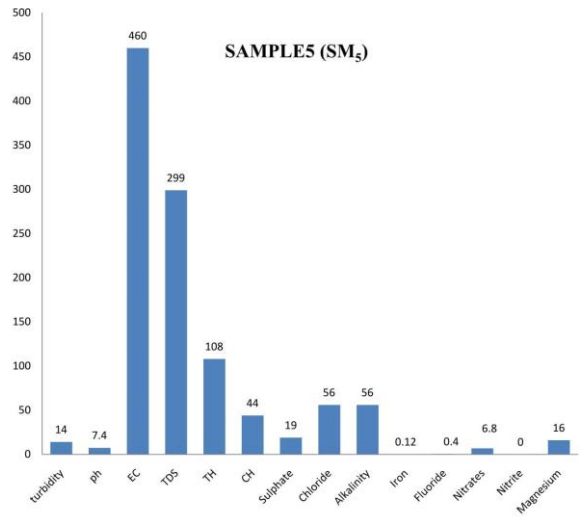
Predicted WQI Values		
Sample	**WQI**	**Status**
SM_1	55.21	Poor
SM_2	55.83	Poor
SM_3	14.6	Excellent
SM_4	70.71	Poor
SM_5	62.24	Poor
Average	**51.72**	**Poor**

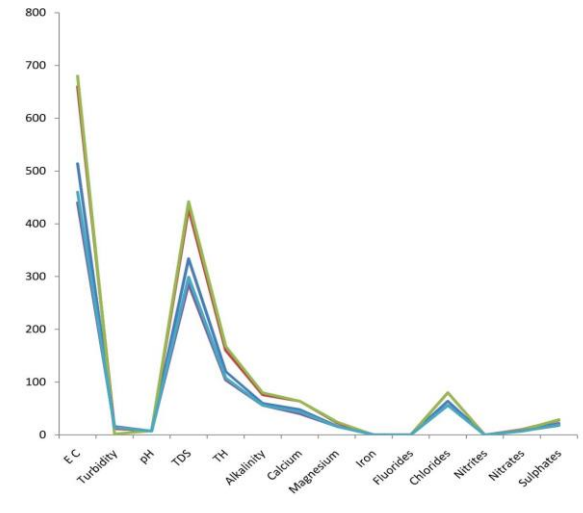






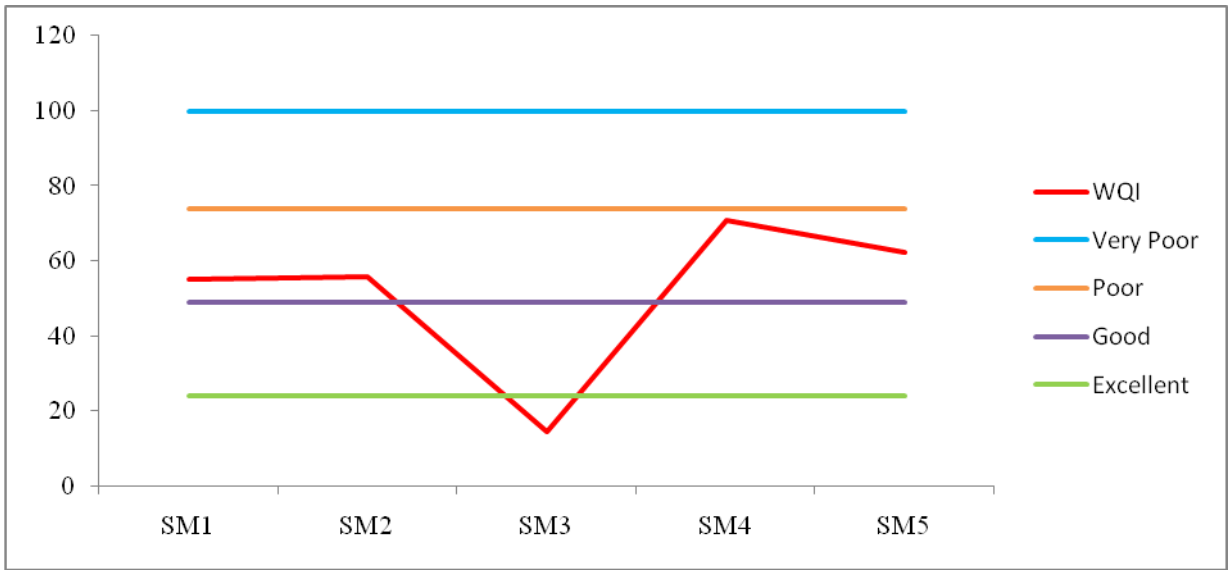






Graph.1.Shows the Variations of results in all parameters

Graph.2.Analysis WQI of all samples



ONCLUSION

This research paper deals the study on Assessment of water quality of Krishna River after Amalgamation of Godavari water via pattiseema. With the help of analytical results, the WQI was estimated using weighted average method with the use of IS10500:2012 standards and those are compared with standard WQI values. The pure Krishna River Water has Good Water Quality, but due to amalgamation of Godavari water its nature changed from Good Quality Region to ***Poor water quality region.*** Not only water quality the flora & fauna for Krishna River has been disturbed.

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